train whose input is directed to the planet carrier and whose output is delivered by the sun gear.

The best mode for carrying out the invention also describes the combined use of the undulant sun gear coupling and ring gear coupling to achieve maximum tolerance to parallel and angular misalignments. In less demanding applications it may be acceptable to use a single undulant coupling to connect one of the sun gear and planet carrier to a first external device while using a more conventional coupling for connecting the other of the sun gear and planet carrier to a second external device.

The damper formed by the cooperation of the first and second supports has been described as a squeeze film damper, however other dampers, such as an elastic material can be introduced into the gap between the inner and outer supports to damp vibrations normally encountered during operation.

These and other modifications to the invention can be made without departing from the spirit and scope of the appended claims.

I claim:

1. In a planetary gear train having:

a sun gear rotatable by a shaft,

a ring gear secured to a ring gear housing, and

a plurality of planet gears rotatably mounted in a planet carrier and meshing with said sun gear and said ring gear,

a coupling system, characterized by:

a sun gear coupling connecting said sun gear to said shaft, said sun gear coupling having at least one undulant flexible section joined to an inflexible spindle for accommodating misalignment between said sun gear and said shaft; and

ring gear coupling connecting said ring gear housing to a nonrotating mechanical ground, said ring gear coupling having at least one undulant flexible portion joined to an inflexible hub for accommodating misalignment between said ring gear housing and said mechanical ground.

2. The coupling system of claim **1**, characterized by:

said flexible section comprising a cylindrical ring having diameter greater than the diameter of said spindle and joined thereto by two longitudinally spaced apart diaphragms, the juncture between said diaphragms, said ring and said spindle being curved in cross section to improve flexibility and minimize stress concentrations; and

said flexible portion comprising an arch radially outward of and connected to said hub, the juncture therebetween being curved in cross section to improve flexibility and minimize stress.

3. The coupling system of claim **1** characterized by a tubular insert secured within the interior of said spindle and having at least two elbows associated with each of said undulant flexible sections for guiding an optical instrument into position to inspect the interior of said flexible sections.

4. The coupling system of claim **1** characterized by a deflection limiter comprising a first support extending longitudinally from said ring gear housing and a second support secured to said mechanical ground, said second support being at least partially longitudinally coextensive with and radially spaced apart from said first support so that contact between said first and second supports precludes excessive radial displacement of said ring gear housing.

5. The coupling system of claim **4** characterized by a vibration damper disposed radially intermediate said first support and said second support to limit the vibration of said ring gear housing.

6. The coupling system of claim **5** characterized by said damper being a squeeze film damper.

7. The coupling system of claim **1** characterized by said ring gear housing having an anti-torque spline, and said mechanical ground having a cooperating spline, said splines being disengaged during normal operation and being engaged to resist rotation of said ring gear housing in the event of the breakage or deformation of said ring gear coupling.

8. The coupling system of claim **1** characterized by said flexible section and said flexible portion each being continuous.

9. The coupling system of claim **1** characterized by said sun gear coupling being driven by a source of torque and rotary motion and said planet carrier supplying torque and rotary motion to an external rotary device.

10. In a planetary gear train having

a sun gear rotatable by a shaft,

a ring gear secured to a ring gear housing, and

a plurality of planet gears rotatably mounted in a planet carrier and meshing with said sun gear and said ring gear,

a coupling system, characterized by:

a sun gear coupling connecting said sun gear to said shaft, said sun gear coupling having at least one undulant flexible section joined to an inflexible spindle for accommodating misalignment between said sun gear and said shaft, said flexible section comprising a cylindrical ring having a diameter greater than the diameter of said spindle and joined thereto by two longitudinally spaced apart diaphragms, the juncture between said diaphragms, said ring and said spindle being curved in cross section to improve flexibility and minimize stress concentrations;

a ring gear coupling connecting said ring gear housing to a nonrotating mechanical ground, said ring gear coupling having at least one undulant flexible portion joined to an inflexible hub for accommodating misalignment between said ring gear coupling and said mechanical ground, said flexible portion comprising an arch radially outward of and connected to said hub, the juncture therebetween being curved in cross section to improve flexibility and minimize stress concentrations;

a deflection limiter comprising a first support extending longitudinally from said ring gear housing and a second support secured to said mechanical ground, said second support being at least partially longitudinally coextensive with and radially spaced apart from said first support so that contact between said first and second supports precludes excessive radial displacement of said ring gear housing.

a vibration damper disposed radially intermediate said first support and said second support to limit the vibration of said ring gear housing;

said ring gear housing having an anti-torque spline, and said mechanical ground having a cooperating spline, said splines being disengaged during normal operation and being engaged to resist rotation of said ring gear housing in the event of